

REMARKS

Claims 1-32 are pending in this application. By this Amendment, claims 1 and 18 have been amended.

In paragraph 4, on page 7 of the Office Action, claims 5-10, 23, 24 and 26 were objected to as being dependent upon a rejected base claim but indicated as allowable if rewritten in independent form including all the features of the base claim and any intervening claims. Although Applicants appreciate this indication of the allowability of these claims, Applicants submit that claim 1, the claim from which claims 2-17 in the application depend, and that claim 18, the claim from which claims 19-32 in the application depend, are allowable for the reasons discussed below.

In paragraph 2, on page 2 of the Office Action, claims 1-3, 11-21, 25 and 27-32 were rejected under 35 U.S.C. §103(a) as being unpatentable over Molinier, U.S. Patent No. 6,758,036, in view of Takahashi et al. (Takahashi), U.S. Patent No. 6,679,050. The rejection is respectfully traversed.

Applicants' invention of claim 1 calls for a device for purifying exhaust gas for an engine having an exhaust passage, the engine being operated with a lean air-fuel ratio, the device comprising a SO_x storage arranged in the exhaust passage for temporarily storing SO_x contained in an exhaust gas inflowing therein; an auxiliary catalyst arranged in the exhaust passage downstream of the SO_x storage, the auxiliary catalyst having an oxidizing ability; SO_x discharging means for discharging SO_x stored in the SO_x storage therefrom; and atmosphere control means for controlling an atmosphere of the auxiliary catalyst, wherein, when SO_x stored in the SO_x storage is discharged therefrom with the atmosphere of the auxiliary catalyst being in a sulfate forming atmosphere, the atmosphere of the auxiliary catalyst is changed to an atmosphere other than the sulfate forming atmosphere, and when SO_x stored in the SO_x storage is discharged therefrom with the atmosphere of the auxiliary

catalyst being in an atmosphere other than the sulfate forming atmosphere, the atmosphere of the auxiliary catalyst is maintained at an atmosphere other than the sulfate forming atmosphere, whereby the formation and discharge of sulfate from the auxiliary catalyst is reduced. Molinier discloses no such thing.

Applicants' invention of claim 18 calls for a device for purifying exhaust gas for an engine having an exhaust passage, engine being operated with a lean air-fuel ratio, the device comprising a SO_x storage arranged in the exhaust passage for temporarily storing SO_x contained in an exhaust gas inflowing therein; an auxiliary catalyst arranged in the exhaust passage downstream of the SO_x storage, the auxiliary catalyst having an oxidizing ability; and SO_x discharging means for discharging SO_x stored in the SO_x storage therefrom, wherein discharge of SO_x stored in the SO_x storage therefrom is prevented or suppressed when the auxiliary catalyst is in, or is turned to, a sulfate forming atmosphere, whereby the formation and discharge of sulfate from the auxiliary catalyst is reduced. Molinier discloses no such thing.

Firstly, the sulfur forming atmosphere described by Molinier does not correspond to Applicants' sulfur forming atmosphere. The sulfate forming atmosphere described by Molinier is an atmosphere in which H₂S, SO_x is trapped in the NO_x absorber. This is described by Molinier at col. 5, lines 61-67 through col. 6, lines 1-6, and shown in Fig. 5. What Molinier is trying to do is prevent sulfur poisoning of the NO_x absorber by introducing fuel to the NO_x absorber prior to a sulfur trap and/or particulate trap regeneration stream entering the NO_x absorber. This is described by Molinier in the Abstract and at col. 5, lines 49-60. In other words, Molinier describes a method for regenerating a sulfur trap in an exhaust system having a sulfur trap disposed upstream of the NO_x absorber in order to prevent or suppress the H₂S, SO₂ from being trapped in the NO_x absorber. Any sulfate that is

trapped in the NO_x absorber in Molinier would not be discharged to the outside air as long as it remains trapped.

The Applicants' invention, on the other hand, is directed to controlling the sulfate forming atmosphere in which sulfate SO₃ is formed and discharged into the outside air. As the Applicants describe on page 23, lines 7-14, "In other words when the auxiliary catalyst 76 is in an atmosphere in which the amount QRED of the reducing agent is smaller than the allowable lower limit amount Q1 and the temperature TA of the auxiliary catalyst 76 is higher than the allowable upper limit temperature TA1, a large amount of sulfate may be discharged from the auxiliary catalyst 76." That is "a large amount of SO₃ may be discharged from the auxiliary catalyst 76 if SO_x flows into the auxiliary catalyst 76 which is in the sulfate forming atmosphere." Applicants' invention addresses this problem. Nowhere, does Molinier disclose a method or device for suppressing and/or preventing SO₃ from being formed and discharged into the air.

Secondly, what the Office Action alleges to be "an auxiliary catalyst (5) arranged in the exhaust passage downstream of the SO_x storage, the auxiliary catalyst having an oxidizing ability" does not correspond to what Applicants describe as an auxiliary catalyst (76). As Molinier clearly describes at cols. 6, lines 15-19 and as seen in Fig. 6, Molinier's NO_x absorber (5) more closely corresponds to Applicants' NO_x catalyst 81. Accordingly, Molinier fails to disclose an auxiliary catalyst that corresponds to the auxiliary catalyst 76 of the Applicants.

Furthermore, the Office Action admits on page 3 that "Molinier fails to disclose that in a sulphate forming atmosphere, a temperature of the auxiliary catalyst is higher than allowable maximum temperature." However, the Office Action alleges on page 3 that "Takahashi teaches an exhaust emission control device for an engine, in which a sulfur like forming atmosphere for a catalyst (9) is clearly defined." Specifically, the Office Action

alleges that the catalyst (9) only absorbs SO_x during a lean air-fuel ratio environment and absorbs more SO_x when a temperature of the catalyst is higher than a predetermined temperature.

But, what Takahashi really discloses is the characteristics of a three-way catalyst and controlling the air-fuel ratio of the exhaust gas flowing into the three-way catalyst. As Takahashi describes at col. 1, lines 65-67 through col. 2, lines 1-4, "an exhaust emission control device for an internal combustible engine which increases the temperature of a downstream catalyst effectively while avoiding the temperature increases of an upstream catalyst." Accordingly, Takahashi does not disclose a device for suppressing and/or preventing SO₃ from being formed and discharged into the air.

Even if Molinier was to consider the teachings of Takahashi, what would Molinier do with them? Molinier is concerned with using the temperature generated or produced from the regeneration phase of the particulate trap purge, so that both high temperature and richness could be achieved simultaneously for desulfurization of an NO_x adsorber catalyst. Molinier would have to look at the Applicants' application as a template in order to change the atmosphere of the auxiliary catalyst from a sulfate forming atmosphere to an atmosphere other than the sulfate forming atmosphere. Thus, there is no motivation to combine because the combination of the method of Molinier and the device of Takahashi would only disclose increasing the temperature of a downstream catalyst effectively while avoiding the temperature increase of an upstream catalyst during the particulate trap purge as both high temperature and richness are achieved simultaneously for the sulfurization of the NO_x adsorbed catalyst.

Accordingly, as neither of the applied references teach, disclose or suggest all the features recited in claim 1, they cannot teach or suggest claims 2, 3 and 11-17 for that reason and for the additional features recited. Similarly, as neither of the applied references teach,

disclose or suggest all the features recited in claim 18, they cannot teach or suggest claims 19-21, 25 and 27-32 for that reason and for the additional features recited. It is respectfully requested that the rejection be withdrawn.

In paragraph 3, on page 6 of the Office Action, claims 4 and 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Molinier in view of Takahashi, and in view of Hirota et al. (Hirota), U.S. Patent No. 5,974,791. The rejection is respectfully traversed.

Takahashi and Hirota failed to overcome the deficiencies of Molinier as applied to claim 1 and, similarly, as applied to claim 18.

Accordingly, as the combination of applied references does not teach, disclose or suggest all of the features recited in claim 1, it cannot suggest claim 4 for that reason and for additional features recited. Similarly, the combination of applied references does not teach, disclose or suggest all of the features recited in claim 18, it cannot suggest claim 22 for that reason and for additional features recited. It is respectfully requested that the rejections be withdrawn.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-32 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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